Small Business Innovation Research/Small Business Tech Transfer

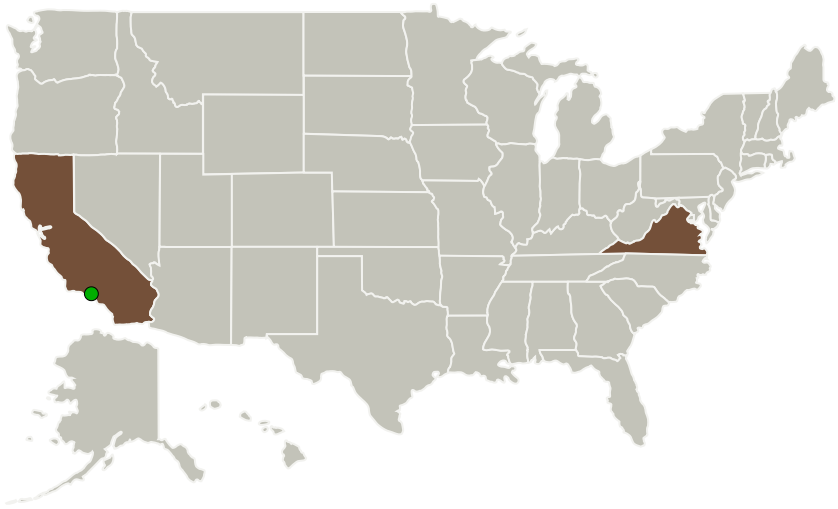
Application of SystemVerilog to Science Mission Simulation, Phase I

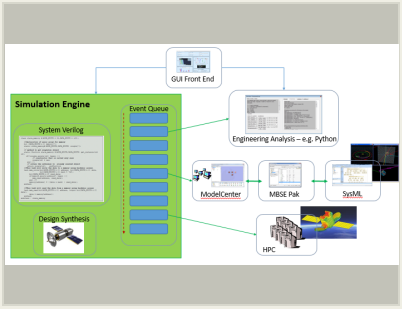
Completed Technology Project (2015 - 2015)

Project Introduction

SynaptiCAD proposes to adapt a commercial digital design simulator for use by complex NASA space systems and missions. The simulator is based on SystemVerilog, an IEEE-standard language with a long pedigree in the electronics world. Digital simulators offer the potential to scale to very large systems since they are already being used to model circuits with millions of events. SystemVerilog, additionally, can easily connect with continuous simulation and engineering analysis tools. Conventional commercial simulators lack this scalability. SynaptiCAD will demonstrate how its own implementation of SystemVerilog, encapsulated in a product known as Verilogger Extreme, can be generalized by creating appropriate APIs and model libraries for satellite, robotics, and science mission simulation. SynaptiCAD will further demonstrate that the simulator can connect readily to other engineering environments such as Python and Phoenix Integration's ModelCenter. A synthesis step will also be illustrated at a basic level, where a hardware design is derived from the resulting simulation. Synthesis is common in the electronics industry and carried out at a highly sophisticated level. A path toward evolving this initially rudimentary synthesis capability will be laid out. The new proposed simulator will demonstrate a realistic NASA problem and show how it can be applied to the full design lifecycle, involving multi-fidelity and multi-disciplinary models. The new simulator will eventually allow for a "digital twin" of a flying spacecraft that can be used for realistic validation both during the design and after launch.

Primary U.S. Work Locations and Key Partners





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Completed Technology Project (2015 - 2015)

Organizations Performing Work	Role	Type	Location
SynaptiCAD Sales, Inc.	Lead Organization	Industry Small Disadvantaged Business (SDB)	Blacksburg, Virginia
Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations	
California	Virginia

Project Transitions

June 2015: Project Start

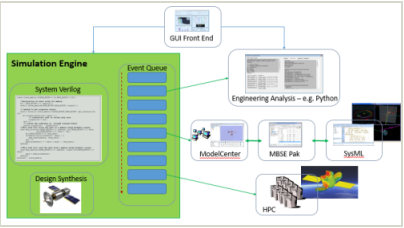
December 2015: Closed out

Closeout Summary: Application of SystemVerilog to Science Mission Simulation, Phase I Project Image

Closeout Documentation:

- Final Summary Chart Image*(https://techport.nasa.gov/file/138820)*

Images



Briefing Chart Image
Application of SystemVerilog to Science Mission Simulation, Phase I *(https://techport.nasa.gov/image/133270)*

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
SynaptiCAD Sales, Inc.

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

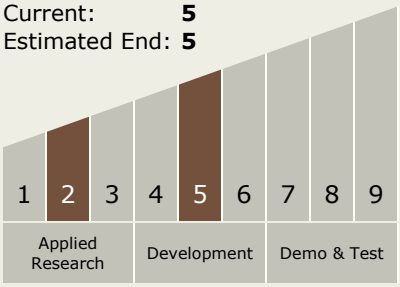
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Peter Menegay

Technology Maturity (TRL)

Start: **2**
Current: **5**
Estimated End: **5**



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Technology Areas

Primary:

- TX11 Software, Modeling, Simulation, and Information Processing
  - TX11.3 Simulation
    - TX11.3.3 Model-Based Systems Engineering (MBSE)

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System